

IN THE DRAWINGS

Please cancel sheets 1 and 3 of the formal patent drawings which were filed with the subject patent application, and consisting of Figs. 1 and 3, respectively. Please replace those cancelled sheets of drawings with the enclosed Replacement Sheets 1 and 3, also consisting of Figs. 1 and 3, respectively.

REMARKS

Applicant, his principal representatives in Germany, and the undersigned have carefully reviewed the first Office Action on the merits of August 20, 2008 in the subject U.S. patent application, together with the prior art cited and relied on in the rejections of the claims. In response, the Substitute Specification, drawings and claims of the subject application have all been amended. It is believed that the claims now pending in the subject application are patentable over the prior art cited and relied on, taken either singly or in combination. Reexamination and reconsideration of the application, and allowance of the claim is respectfully requested.

When a web of material is to be printed, particularly in offset printing and in color, a plurality of partial print images are applied to the web as it passes from a first printing group to a second printing group. Since most color printed images on, for example, newspaper are formed using blends of four colors, there are typically four printing groups arranged one after the other in a direction of travel of the material to be printed. Each such printing group has at least one forme cylinder with at least one printing forme on its outer surface. Each such printing forme can provide one or more print image locations. Each of these print image locations will form a portion of its respective print image on the material web, as that web passes through the several printing groups. When the material web exits the last of the four printing groups, the complete color image will have been formed.

Since the complete image is formed in a succession of steps, it is important that all of the print image locations, which will cooperate with each other to form the complete image, be in proper registration with each other. If they are not, the result is an image whose color is not true, where images are blurred and whose quality is generally poor.

As is discussed in detail in the Substitute Specification, and particularly at paragraph 017 thereof, the web of material being printed will elongate both longitudinally and laterally as it undergoes its printing process. This is known generally as "fan-out" effect and is well known in

the art as being a cause of registration issues. If the fan-out effect is not considered and compensated for, the resultant printed image will not be of good quality.

During printing of a web of material, the web is pulled through the serially arranged printing groups under a defined tension. As the web passes through each group, it is subjected to the application of a liquid ink and also often to the application of a dampening fluid, such as water or the like. The tension, in combination with the liquid ink and dampening fluid, causes the web of material to expand or to deform both longitudinally in the direction of web travel, and laterally, transversely to the direction of web travel. The amount of the web deformation is a function of web tension, the ink and dampening agents being applied and is also a function of the web of material itself:

As discussed in paragraph 018 of the Substitute Specification, an expected elongation, either longitudinal, transverse, or both, can be determined, or is known from the characteristics of the web and from prior experiences with the web. If the web deformation is known in advance, the positioning of the print image locations on the forme cylinders of respective areas of the printing group can be determined in advance of the start of the printing process. This is a substantial departure from prior practices in which a press operator would initially run the press, would then evaluate the quality of the image, and would then stop the press and make changes in the print image locations by adjusting the printing formes on the printing cylinders. As may be readily understood, this was a tedious, time-consuming procedure which was wasteful of materials and which was, at best inaccurate.

In accordance with the present invention, as recited in currently amended claim 43, the anticipated deformation of the web of material is considered and is taken into account when the print image locations are placed on the printing formes which are attached to the forme cylinders. Since the deformation characteristics of the web of material are known, the print image locations on the printing formes of successive ones of the forme cylinders of the printing groups can be determined. If it is known that a particular material web has a specific amount of

longitudinal and/or lateral elongation, the print image locations on successive ones of the printing formes on the successive forme cylinders can be properly located in advance of the start of the actual printing process.

Once the printing process has begun, various sensors or detectors can be used to check the print quality and to determine if the print image locations were proper. If there are still minor issues, one way of dealing with them is through the use of an image regulator. As will be discussed shortly, such an image regulator is a device which is well known generally in the art. It is the purpose of the image regulator to compensate for the fan-out effect of the web of material by forming minute corrugations or waves in the material web. These have the effect of effectively shrinking the web's effective width so that minor compensations for the fan-out effect can still be made. It is part of the subject invention to use such an image regulator in conjunction with the process of locating the print image locations on the printing formes, prior to the start of the printing process, in recognition that the web of material, whose particular characteristics are known, will have a determinable amount of web deformation.

A third step in the subject invention can be the displacement of one or more of the printing formes on its respective one of the forme cylinders, again once the printing process has been started. Such a repositioning of the printing forme, either axially or circumferentially, can also be usable to compensate for the registration errors that result from the fanning-out of the web of material, as it is being printed. This combination of procedures, result in the provision of a multiple color printed image which is in better registration than has been possible in the past.

In the Office Action of August 20, 2008, claims 44-54 and 58-62 were withdrawn from consideration. Since the Restriction Requirement of January 5, 2008 indicated that all of these claims were linked by independent claim 43, these claims have been withdrawn from consideration. It is assumed that they will be rejoined by the Examiner upon the indication of the allowance of claim 43.

The drawings were objected to as not showing all of the features of the invention specified in the claims. It was asserted that an image regulator; a detection device; a controllable drive mechanism and a control unit were not shown in the drawings. As will be discussed in greater detail below, the drawings clearly show the image regulator 38. The detection device, the controllable drive mechanism and the control unit, all of which are described in detail in the Substitute Specification, have been added to Figs. 1 and 3 of the drawings, together with appropriate reference numerals and lead lines. It is believed that the drawings now pending in the application show all of the features of the claims. The changes made to the drawings, as will be discussed below, do not constitute any new matter. Their entry is respectfully requested.

The Substitute Specification was objected to in the first Office Action. The existence of several minor typographical errors was noted. In response, the Substitute Specification has been reviewed in detail. The several typographical errors noted in the Office Action have been corrected. Several other similar minor errors have also been corrected. In addition, several paragraphs of the specification have been revised to add reference numerals and drawing figure designations for the amended sheets of drawings. None of these changes or additions are believed to constitute any new matter. These additions are respectfully requested.

Claim 43 and 55-57 were rejected under 35 U.S.C. 112, first paragraph. It was asserted that the structure of image regulator, the detection device, the controllable drive mechanism and the control unit are not provided in the specification with sufficient clarity to provide one of skill in the art with an understanding of how these devices function. The undersigned respectfully disagrees for the following reasons.

With respect to the image regulator, it is to first be noted that such a device does not displace a printing forme on a forme cylinder. Claim 43 was inaccurate in that respect and has been amended accordingly.

As may be seen in Fig. 1 of the drawings, as filed, there are provided image regulators 38 after the several serially arranged printing couples or printing groups. These image regulators are discussed in paragraphs 006 and 036 of the Substitute Specification. As discussed at paragraph 036, the purpose of an image regulator 38 is to compensate for primarily lateral elongation of the web of material. This is done by deforming the web of material, typically in a wave shape. An image regulator can use rollers that are placed against both sides of the web. These rollers impart a very slight corrugation to the web, which has the effect of reduction of the width of the web. Alternatively, air nozzles can be used to impart similar corrugation to the web.

Image regulators are generally well known in the art. The Examiner is invited to review the disclosure of U.S. Patent No. 5,487,335 to Iijima and of U.S. Patent No. 6,189,449 to Tomita for discussion of roller-type image regulators or web width adjustment devices. The prior U.S. Patent No. 6,021,713 to Glöckner also includes a discussion of arrangements for considering the fan-out effect in a web. The Glöckner document was cited in the Information Disclosure Statement which was filed with the subject application. Both of the Iijima and Tomita German counterpart documents were also cited in the Substitute Specification and were noted in the Information Disclosure Statement. It is believed that the disclosure of the image regulator in the Substitute Specification overcomes the rejection of claims 43 and 56 under 35 U.S.C. 112, first paragraph.

Turning now to the detection device, the Examiner is invited to review the Substitute Specification at paragraph 029. It is there recited that a detector unit is connected with a control unit and could be a device that optically detects, and digitally evaluates the print image 11. Fig. 1 has been amended to show such a detection unit schematically at 44. The detector unit could be a semiconductor camera with a CCD sensor, as discussed at paragraph 029 of the Substitute Specification. Claim 55 has been amended to change "detection device" to "detector

unit". It is believed that this change and the above discussion overcomes the rejection of claim 55 under 35 U.S.C. 112, first paragraph.

A controllable drive mechanism for the forme cylinder and for the transfer cylinder of a printing group is discussed at paragraph 026 of the Substitute Specification. As is set forth in that paragraph, the controllable drive mechanism can be an electric motor and specifically can be a frequency controlled electric motor. Fig. 3 of the drawings has been amended to schematically show such a controllable drive mechanism at 40. The control unit that is also set forth in claim 57 is described in paragraph 027 of the Substitute Specification. It can be a control console 42 that is assigned to the printing press 01. Fig. 1 has been amended to schematically show such a control unit or control console. Also note the discussion in paragraph 028 of the Substitute Specification with respect to a further explanation of the functioning of the control unit and its operation with the detection unit. The control unit can operate devices which are connected to it to properly locate the print image location of the printing formes. Again, it is believed that the recitations of claim 57 are set forth in the Substitute Specification, and are depicted in the drawings, as amended, with sufficient clarity so that one of skill in the art can make and use the invention.

Claim 43 was rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1182 035 to Kusunoki in view of U.S. Patent No. 6,729,239 to Edamitsu. Claims 55-57 were rejected under 35 U.S.C. 103(a) as being unpatentable over the above combination and further in view of U.S. Patent No. 5,816,151 to Wang.

It is believed that independent claim 43, as filed, and even more clearly as amended, is patentable over the prior art cited and relied on, taken either singly or in combination, for the reasons set forth below. It is noted that the Kusunoki reference is the equivalent of U.S. Patent Application Publication No. 2002/0023558. The subsequent discussion of the Kusunoki reference will be directed to the U.S. application.

In the Kusunoki application, there are depicted four, and possibly a fifth set of printing units P. Each one of these includes a plate cylinder PC and a blanket cylinder BC, all as depicted in Fig. 1. Each plate cylinder is physically split longitudinally into two plate cylinder halves. Each such plate cylinder half can be moved both laterally and circumferentially to attain better registration.

It is agreed that Kusunoki shows at least first and second printing groups arranged sequentially after each other in a direction of web travel. It is also agreed that Kusunoki shows at least one forme cylinder PC and at least one transfer cylinder BC in each of the printing groups. It is further not disputed that the Kusunoki reference describes the placement of at least one printing forme on the surface of each of the forme cylinders. What the Examiner fails to also note is that each plate cylinder or forme cylinder is divided into two cylinder halves. These cylinder halves PC₁ and PC₂ are movable axially and circumferentially by the operation of suitable drive motors.

As discussed at paragraph 0053 of the Kusunoki reference, after the printing formes are attached to the cylinders, "...printing may be started by setting the cylinder drive motors 2 of all the printing units into rotation at a prescribed printing speed...". Any image repositioning that may then be required will be accomplished by advancing or delaying the speed of the cylinder drive motor or motors 2. The readjustment of the cylinder drive motors can be continued until the registration is accomplished.

As acknowledged by the Examiner in the Office Action, the primary reference does not take into consideration any elongation of the web in its registration correcting efforts. More importantly, the primary reference only reacts to sensed registration errors. It does not operate proactively. Claim 43, as filed, and as amended recites the determining of an amount of at least one of a web transverse elongation and a longitudinal elongation of the material to be printed prior to the printing of the material (emphasis added). The anticipated elongation is compensated for by locating the first print image location on the printing forme of the first forme

cylinder and by locating the second print image location on the second printing forme of the second forme cylinder. It is to be noted that the Kusunoki reference moves the printing formes on the forme cylinders after the fact; i.e. after a registration error has been noted. In the present invention, as recited in claim 43, the print image locators are selected on the printing formes before printing even starts. This is done based on the anticipated elongation of the web of material.

The secondary reference to Edamitsu is not relevant to the subject invention and does not provide the teachings which are absent from the primary reference. The Examiner's comments with respect to this secondary reference are examples of an argument which is based on the use of sections of text taken out of context.

Initially, it is to be noted that the Edamitsu device is used to print on individual sheets which are depicted in a paper feed at 10 in Fig. 1. The sheets are printed by contact with first and second blanket cylinders 3 and 4, while each of these sheets is gripped by an impression cylinder 5. Each blanket cylinder 3;4 receives its inked image from an associated one of first and second plate cylinders 1 and 2. Each of the plate cylinders is movable from its solid line, operative position, as shown in Fig. 1, to a position shown in dashed lines, also in Fig. 1, where it is beneath an image recording part 13. The purpose of that image recording part 13 is to form an image to be printed on the surface of a printing forme which is attached to the forme cylinder 1 or 2. Note Fig. 8 for a depiction of a plate cylinder with two printing plates.

The Examiner's assertions that element 13 is an image regulator is not correct. In the Edamitsu reference, the element 13 applies an image to be printed to a printing plate. In the language of currently amended claim 43, and as discussed above, the image regulator, generally at 38, is used to adjust the physical dimensions of a paper web, after it has been printed, to compensate for dimensional changes in the web.

A key difference between the Edamitsu device and the subject invention may be understood by referring initially to Figs. 1 and 3 of Edamitsu. An image pick up part 16 is

provided. It is used after the sheets have been printed, to scan the printed images and to detect registration errors. The Examiner is requested to review the discussion of the operation of this image pickup part, as is set forth at column 8, lines 45-48. Once the printed image has been picked up by element 6, it can be analyzed, by magnification. See the flow charts set forth in Fig. 7, for example. The data is provided to a control part 17, as discussed at column 9, lines 10-14.

Referring specifically to the Examiner's selective use of portions of the Edamitsu disclosure, the following comments are believed to be appropriate.

The degree of magnification of a printing color is used to accurately determine an amount of actual deformation of the printed image. The type of paper that is being used can be one factor that will determine how great a magnification of a previously printed image should be used to detect image deviation.

Column 5, lines 28-34 is a depiction of one color image 1M that is printed by one plate. It includes four registration marks. The discussion at column 5, lines 28-34 does not have anything to do with the asserted compensation of an anticipated elongation, as advanced by the Examiner.

Fig. 9 shows an out of registration image, where the registration marks of each of the several individual color components are not in alignment. Fig. 9 is discussed at the bottom of column 12 of the Edamitsu reference. The offsets of the second color image, with respect to the first color image, are measured and are placed in a corrective database 42. This is contained in the storage means 43.

The asserted image regulator 13 of Edamitsu is, in fact, an image recording unit. It has the function of forming image print locations on the printing formes of the printing cylinders. It is not at all similar, in function or operation, to the image regulation of the subject invention.

The correctional procedure described, starting at the bottom of column 11 of Edamitsu is based on first recording an image on the printing plate. There is no discussion of a

determination of an actual one of transverse and longitudinal elongations of the web of material. In Edamitsu, it is again to be kept in mind that the material is a sheet, not a web. The positioning of the images on the plates is based on an analysis of previous printed images, using the image pick up part 16. The Examiner is requested to review the discussion at column 12, lines 43-49 of the reference. Again, the Examiner's assertions are not supported by a careful reading of the document.

Fig. 8 does not depict the displacement of one printing plate on a plate cylinder using the image recording part 13. The reference marks R3 and R4 are not on the material to be printed until they are placed there by the actual plates. Column 5, lines 28-34 are not supportive of the Examiner's asserted teachings.

The combination of the two references would not render obvious the subject invention, as set forth in currently amended claim 43. The subject invention utilizes a three step process to counteract the effects of web deformation. Initially, the locations of the print images are placed on the printing formes to compensate for anticipated elongations of the web. This is clearly recited in currently amended claim 43. This procedure compensates, in advance, for virtually all of the registration errors that would otherwise occur.

An image regulator is provided and is usable to change the physical dimensions of the web, during the printing process based on actual elongations of the web. Since the actual elongations may be slightly different from the anticipated elongations, the use of the image regulator provides a fine tuning step that can be performed while the web of material is being printed.

In a third aspect of the claimed invention, at least one of the printing formes can be displaced on the forme cylinder. This is a registration of last resort since forme shifting mechanisms are expensive and is not as easily accomplished as is the provision and use of the image regulator.

The three steps recited in currently amended claim 43 are not taught, or suggested by the combination of references relied on by the Examiner in the rejection of the claims. Claims 55, 56 and 57 depend from believed allowable currently amended claim 43 and are also believed to be allowable. The Wang reference does not supply the teachings which are missing from the Kusunoki and Edamitsu references. Allowance of these claims is believed to be appropriate as is rejoinder of the currently withdrawn claims.


SUMMARY

The Substitute Specification, drawings and claims of the subject application have been amended. The changes to the Substitute Specification and to the drawings are believed to not constitute any new matter. The claims are believed to be patentable over the prior art cited and relied on. Allowance of the claims, and passage of the application to issue, is respectfully requested.

Respectfully submitted,

Günther Oskar ECKERT
Applicant

JONES, TULLAR & COOPER, P.C.
Attorneys for Applicants

By: 
Douglas R. Hanscom
Reg. No. 26,600

November 19, 2008
JONES, TULLAR & COOPER, P.C.
P.O. Box 2266 Eads Station
Arlington, Virginia 22202
(703) 415-1500
Attorney Docket: W1.2279 PCT-US